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2. MISCELLANEOUS OBSERVATIONS ON YUCCA.

BY WILLIAM TRELEASE.

YUCCA GIGANTEA.

In the course of a walk through the celebrated gardens of José do Canto in Ponta Delegada, St. Michaels, in August, 1894, in company with their owner, my attention was attracted by a magnificent Yucca, some thirty feet high, and with a trunk not far from three feet in diameter, which at that time was covered with immense erect panicles of white flowers. Some few of the flowers which had fallen to the ground, showed the structure characteristic of *Y. gloriosa*,* and the leaves, which were all at a considerable height, though somewhat large and relatively broader than is usual in that species, appeared to have the usual longitudinal plication of *Y. gloriosa*, to which species I then supposed that the plant belonged.

Unfortunately the tree was seen just on the eve of my departure from the Azores, so that I was unable to make a study of it on the spot; but my friend Captain F. A. Chaves was obliging enough the next summer to make for me the photographs which are here reproduced. Though in 1895 only two panicles of flowers were produced, in place of the many observed the preceding summer, one of these was cut and separately photographed, so that its character as well as that of the leaves, specimens of which (over 2¼ in. wide and nearly a yard long) were sent to me, is sufficiently illustrated.

In the course of my conversation with Sr. do Canto, I asked if this tree had ever been known to fruit, knowing that *Yucca aloifolia* commonly sets fruit under cultivation,† and that *Y. gloriosa* (but apparently usually by error) occasionally has been said to do so, when the Yucca Moth is not present to effect pollination;[*] and I was informed that this particular tree has several times ripened a number of fruits, from which seedlings have been raised. Seeing my interest in the matter, Sr. do Canto was kind enough to instruct his gardener that if any fruits ripened that year they were to be saved for me, and toward the end of the following winter I received two, which are closely comparable with those of *Y. gloriosa*, possessing the firm core and tardily drying indehiscent pulp of that species;[†] though the somewhat greater thickness of this pulp goes to show the relationship of the Clistoyuccas, as represented of *Y. gloriosa*, *Y. gigantea* and *Y. brevifolia*, with the Sarcoyuccas, of the *aloifolia* and *Guatemalensis* type.[‡] Several seedlings, from an earlier fruiting of the tree, were also sent to the Garden, where, with a few raised from the relatively few good seeds of these fruits, they are in cultivation.

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* Rept. Mo. Bot. Gard. 3. *pl. 50.*

† Rept. Mo. Bot. Gard. 4: 182.

Though in flower, fruit and seed characters, this tree might well pass for *Y. gloriosa*, it is much larger than any specimen of that species to which I have found reference,— a fact perhaps in part due to the very favorable climate of the Azores. But on closer examination its leaves prove also quite different from those of *Y. gloriosa*, in that they are large and broad, as in *Y. Guatemalensis*, to which, indeed, barring the absence of a slight roughness on the principal plications, they bear close resemblance, while they are slightly roughened on the margin and much more plicate longitudinally than in any form of *Y. gloriosa* that I have examined. Although the trunk does not appear to be dilated below as is that of *Y. Guatemalensis*,[§] — at least in specimens of the size cultivated in plant houses, — the seedlings are strongly bulbously dilated at the base of the first phytomer, even after they have reached a considerable size.

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[*] Rept. Mo. Bot. Gard. **4**: 199.—Sargent, Silva **10**: 24.

[†] Rept. Mo. Bot. Gard. **3**: 165. *pl. 50.* 1892.

[‡] Rept. Mo. Bot. Gard. **4**: 224.

[§] Rept. Mo. Bot. Gard. **4**: *pl. 1.*

On the whole, therefore, it seems necessary to recognize *Y. gigantea* as distinct from *Y. gloriosa* and *Y. Guatemalensis*,— its nearest allies, and the Azorean specimen here figured may be taken as an excellent example of this species. Concerning it, Sr. do Canto informs me that it was purchased as a 2- or 3-year old seedling, in March, 1854, from Makoy, of Liége, under the name of *Dracaena*, sp.

Yucca gigantea * was first described and named by Lemaire, who found it in flower in October, 1859, in the houses of M. Verschaffelt, of Gand, who had obtained it from an amateur near Antwerp, who knew nothing of its origin and had seen only two or three specimens. M. Lemaire states that until it bloomed he had regarded it as an unpublished species of *Dracaena* (under which name, as above stated, it appears that Sr. do Canto had purchased it some five years earlier) or perhaps of *Fourcroya;* and he assumes its native home to be probably Mexico.

Some three years ago, the Garden received from Dr. F. Franceschi, of Santa Barbara, Cal., a small plant of the same species, which, with three others, he had obtained from a European correspondent, all of them being rooted cuttings of the stem of an older plant which he thinks came from Belgium, probably from the original collection on which the specific description was based. Dr. Franceschi adds that he does not know that seeds of it have ever been handled by the trade; and that on a young specimen planted out in his grounds the leaves have reached a length of four feet, and a breadth of four inches.

While the relatively large size of all of its parts, as shown in house-grown specimens, seemed so striking to the author of the species as to lead him to call it "the king," "the giant" of its genus, the development which it may assume when grown in the open air in a favorable climate still more justifies the intensive specific name given to it.

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* Lemaire, Illustr. Horticole **6**. Miscellanées 91. Nov. 1859; Revue Horticole **9**: 222. 1860.— Baker, Journ. Linn. Soc., Bot. **18**: 224. 1880.

MEMORANDA ON THE POLLINATION OF YUCCAS.

In the Fourth Report of the Garden a résumé of what was then known of the pollination of Yuccas was given, and the results of a somewhat extensive field study of several species were published.* Since the publication of that paper, so far as I know, no considerable addition has been made to our knowledge of the subject, except that in the following year Professor Whitten filled a gap in the observations on *Y. filamentosa* by observing and describing the circumstances attending the emergence of the *Pronuba* larvae from the capsules of that species.†

In the meantime the arborescent species have been subjected to a critical systematic study by Professor Sargent, who has found it necessary to adopt names for some of the species which differ from those employed in my ecological paper, so that, as a means of avoiding confusion it is to be noted that the following changes in nomenclature should be made in my paper, to conform it to Professor Sargent's revision.‡

Y. baccata, Trelease, Rept. **3**. *pl. 2*.— **4**: 185–190. *pl. 20*, which is the arborescent form, becomes *Y. Mohavensis*, Sargent, Silva **10**: 15–16. *pl. 500*. No observations on the pollination of the true dwarf *Y. baccata*, therefore, appear to have been published.

Y. australis, Trelease, Rept. **4**: 190–192. *pl. 4–5*, by priority becomes *Y. macrocarpa*, Coville,— Sargent, Silva **10**: 13–14. *pl. 499*. In the early part of 1897, while attempting to study the pollination of *Y. Treculeana*, in southeastern Texas, I met Mr. Samuel T. Tyson, a mining engineer, of Mapimi, Mexico, who became sufficiently interested in the subject to promise to observe what he could on the arborescent Yuccas of the mountains of Durango, and about the middle of April I had the satisfaction of receiving from him several specimens of *Pronuba* obtained from the flowers of the common " Palma " of that region, which is described as having an upright panicle, and is evidently the same as the Carneros Pass specimens of Mr. Pringle, which have generally been referred to the present species.* The moths, the females of which were abundantly laden with pollen balls, and concerning the activity of which in the pollination of this species there can be no doubt, though they were not actually observed at work, prove to be *Pronuba yuccasella*. This moth, therefore, is shown to be the active agent in the pollination of Yuccas from Florida northward as far as fruit is set as a result of *Pronuba* activity, westward as far as southern California,† and into the mountains of northern Mexico, to the south.‡ Whether, as Professor Riley surmised,§ *Y. Treculeana*, lying in the region between Southwestern and Mexican species not known to be pollinated by *P. yuccasella*, and *Y. filifera*, the " Palma de San Pedro," occurring in northern Mexico with *Y. macrocarpa*, but, as Mr. Tyson writes, blooming later than the latter, more dependent upon the rains, and consequently more variable in its time of flowering, are pollinated by distinct species of moths, remains to be shown by direct observation, but so far as the former is concerned, this is doubtful.

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* Trelease, Further studies of Yuccas and their pollination. Rept. Mo. Bot. Gard. **4**: 181-226. *pl. 1-10, 15-23*. 1893.

† Whitten, The emergence of Pronuba from the Yucca capsules. Rept. Mo. Bot. Gard. **5**: 137-8. 1894.

‡ Sargent, The Silva of North America **10**. 1896.

Y. brevifolia, Trelease, Rept. **4**: 193–9. *pl. 6–9, 21*, becomes, for reasons of priority, *Y. arborescens*, Trelease,— Sargent, *l. c.* **10**: 19–21. *pl. 502.*

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* Trelease, l. c. **4**: 191.— Sargent, l. c. **10**: 14.

† Trelease, Rept. **4**: 222.

‡ The Mexican specimens here referred to have been deposited in the National Museum.

§ Rept. Mo. Bot. Gard. **3**: 121, 122.

In another part of the present volume I have shown that *Y. gigantea*, which has usually been confounded with *Y. gloriosa*, like *Y. aloifolia* sometimes sets fruit without the intervention of *Pronuba.*[*]

Y. elata, Trelease, Rept. **4**: 193–9. *pl. 10, 15, 22*, for like reason of priority becomes *Y. constricta*, Buckley,— Sargent, *l. c.* **10**: 27–8. *pl. 504.*

A PROLIFEROUS YUCCA.

Some years since, while collecting in the Southwest, Miss A. I. Mulford secured an inflorescence of *Yucca constricta* (*Y. elata*) which is figured on the accompanying plate, in which the upper bracts subtend rather dense clusters of short ultimately slightly filiferous leaves, above some of which flowers stood, so that the fascicles evidently represent the upper branches of a normal panicle. But the most interesting feature of the specimen is an apical tuft of more filiferous leaves about five inches long, which, though somewhat intermediate in character between bracts and foliage leaves, clearly act as the latter.

A number of species of *Agave*, of the Euagave section, are known to be normally viviparous, producing bulblets in place of many of the flowers in their panicles, and occasionally the production of bulblets in the inflorescence of an *Agave* of the section Littaea has been observed,[†] but I am not aware that anything of the kind, or anything approaching the present case, has yet been recorded for *Yucca*.

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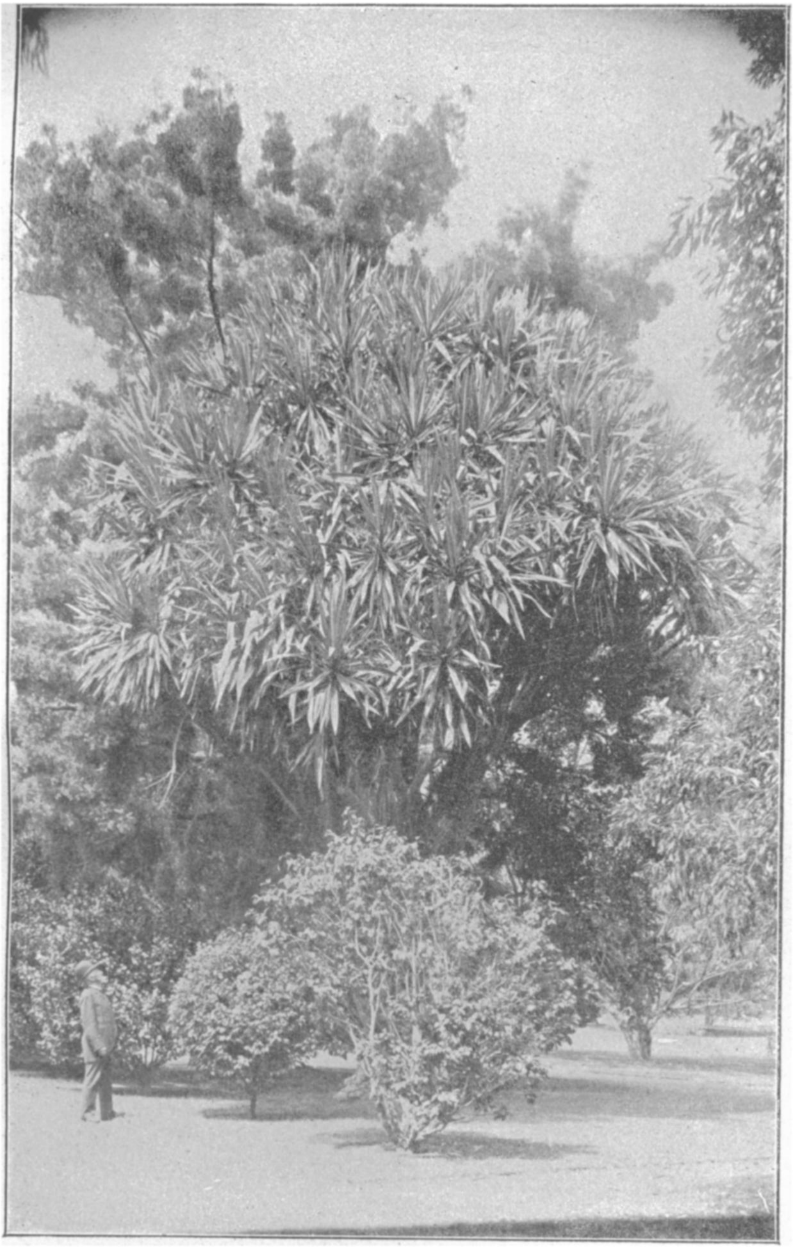
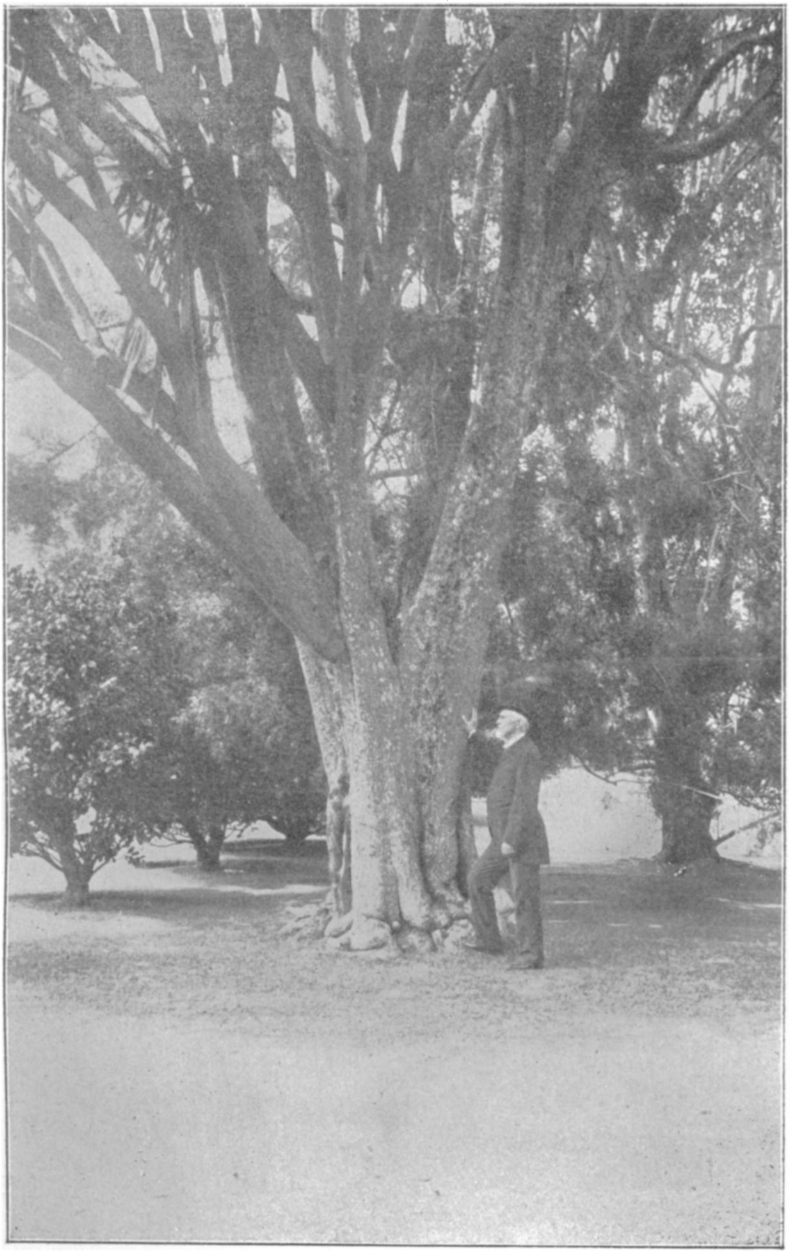
[*] Supra, pp. 141–2.

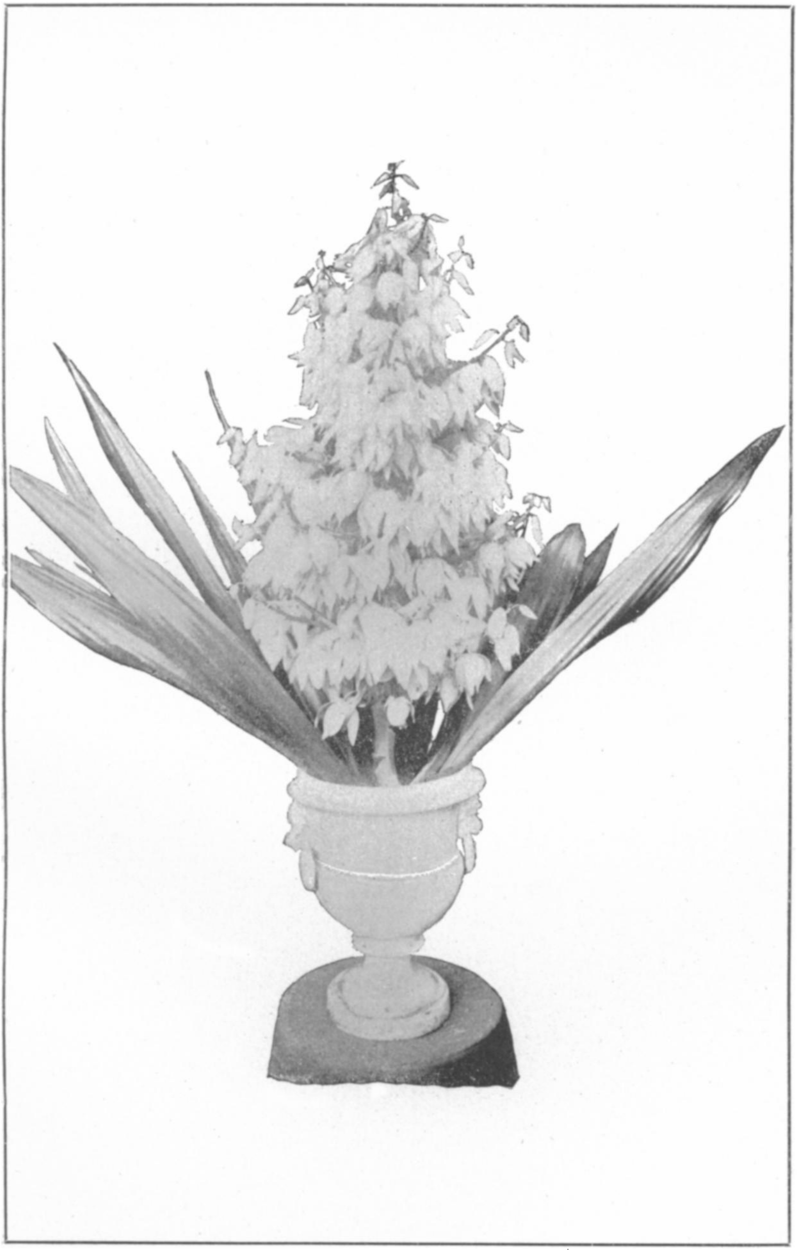
[†] Miss Mulford, Rept. Mo. Bot. Gard. **7**: 56. *pl. 62*.— Rose, Rept. Mo. Bot. Gard. **9**: 122.



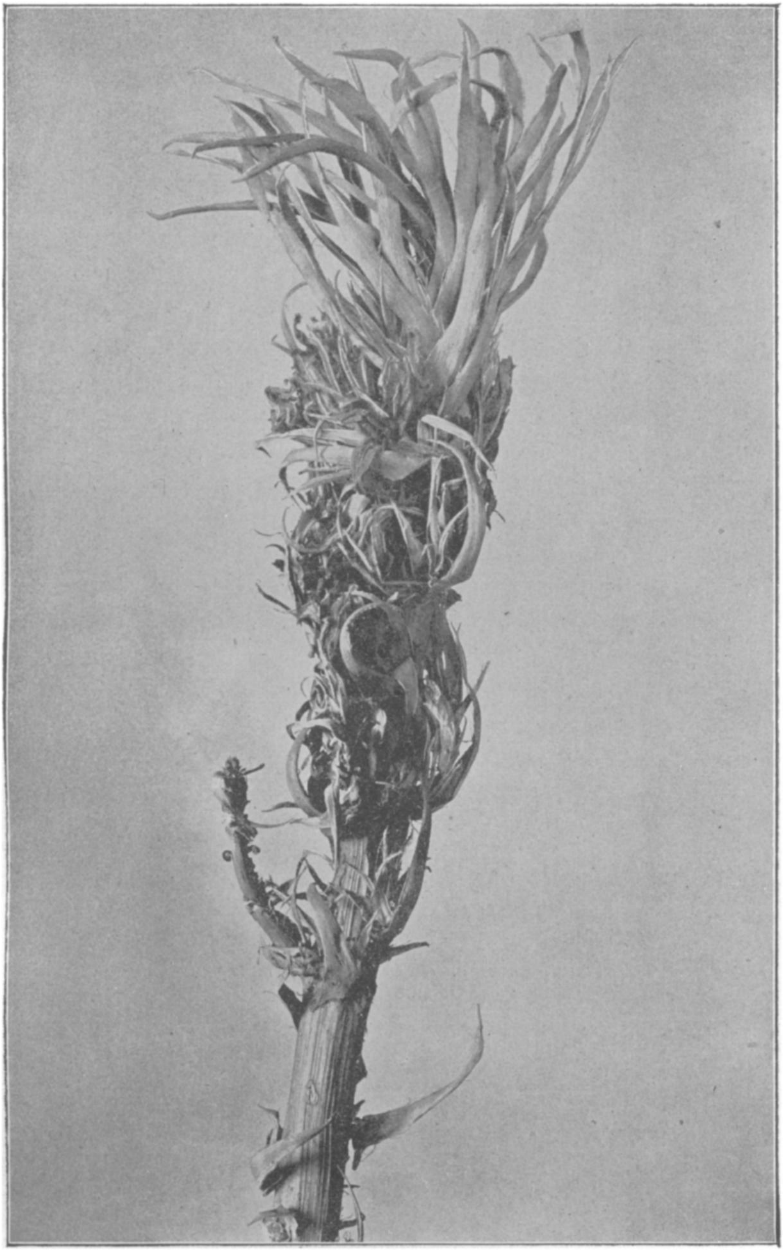
YUCCA GIGANTEA.



YUCCA GIGANTEA.



YUCCA GIGANTEA.



TERATOLOGICAL YUCCA CONSTRICTA.